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INNOVATING AT CULTURAL CROSSROADS: HOW MULTICULTURAL SOCIAL NETWORKS PROMOTE IDEAS FLOW AND CREATIVITY.

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ABSTRACT

Diversity in social networks is often linked to enhanced creativity. Emerging research on exposure to diverse informational resources (e.g., ideas and knowledge) however has painted a more complex picture regarding its effect on individuals' creative performance. This research examines the effects of culturally diverse networks on the flow of ideas and individuals' creativity. Combining social network analysis with experimental methods, two studies using different samples found that a culturally diverse network increases the likelihood of receiving culture-related novel ideas (but not other types of novel ideas) from network contacts, whether or not these contacts share one's own culture of origin. Additionally, the creativity effect of network diversity depends on the type of tasks. Networks' degree of cultural diversity increases creativity on tasks that draw on varied cultural-knowledge resources but not on other types of tasks. These findings highlight that network diversity provides access to specific forms of knowledge and has a domain-specific effect on creativity. Theoretical and practical implications for creativity and social network research are discussed.

Keywords: creativity, social network, culture, diversity, multiculturalism

Recent organizational research has begun to link social networks to individuals' creativity (Baer et al, 2015; Burt, 2004; Rodan & Galunic, 2004; Perry-Smith, 2006; Obstfeld, 2005; Lee, Santiago, & Chen, 2007; Uzzi & Spiro, 2005). A basic principle that underlies this claim is that network structures or compositions that provide access to diverse, non-redundant informational resources (e,g, new ideas and knowledge) have the potential to spur creative thinking (e.g., Baer et al, 2015; Burt, 2004). Yet, this well-received principle regarding the creativity benefits of network diversity leaves critical questions unanswered. Specifically, what kind of novel informational resources does a diverse network bring? From which contacts in the network do these informational resources come from? Importantly, does having access to such diverse informational resources spur creativity in general or only for specific types of tasks?

These questions are important because although the principle that access to diverse informational resources is a key driver of how networks can increase individuals' creativity is well accepted in network research, emerging research that investigates exposure to diverse information and knowledge painted a more complex picture on its effect on individuals' creative performance (Perry-Smith, 2014; Leung, Maddux, Galinksy, & Chiu, 2008). For example, Perry-Smith (2014) recently found that the type of informational resources that one receives from the network matters. Thus, the link between network diversity and creativity appears not to be a straightforward one.

In this research, I seek to address the above questions by examining the effects of culturally diverse social networks on the flow of informational resources and individuals' creativity. I propose that a culturally diverse network promotes the flow of novel ideas and knowledge from cultures other than one's own (henceforth referred to as culture-related novel ideas) more than other types of ideas. For example, an American brand manager might receive from his or her multicultural network novel ideas about marketing strategies in foreign cultures. Culture-related novel ideas however do not necessarily come from contacts who are culturally different from

oneself. This is because a culturally diverse network also serves as a perceptual cue for network contacts that one is cosmopolitan and receptive to diverse ideas from different cultures, prompting even same culture contacts to share with them culture-related informational resources. Because new ideas from other cultures, regardless of where they are derived, serve as domain-specific knowledge (Amabile, 1983) as well as provide new cultural perspectives that are useful for general creative problem solving, the impact of culturally diverse networks may or may not be domain-specific. I therefore further examine whether the creativity benefits of a culturally diverse network is limited to tasks that require drawing on knowledge from and about multiple cultures, and test the alternative hypothesis that its effect is generalizable to other types of tasks that do not require such knowledge.

This research makes two key contributions. First, this work is the first to show the effects of network cultural diversity on creativity. Although prior network research has examined how various types of diversity affect creativity (e.g., Rodan & Galunic, 2004; Obstfeld, 2005), the effects of cultural diversity in social networks on creativity have not been empirically demonstrated. Yet with prevalent human migrations and travel, people's networks are increasingly multicultural. Recent research has found that exposure to foreign cultures aid creativity (Leung & Chiu, 2010; Maddux & Galinsky, 2009). As a mode of exposure to diverse cultures, social networks differ from other modes of cultural exposure that have been previously studied, e.g., living abroad and exposure to foreign films, etc. (Leung & Chiu, 2010; Maddux & Galinsky, 2009). Exposure to foreign cultures may not always involve forming meaningful on-going social exchange relationships with foreigners. A distinctive feature of a network is that it facilitates a variety of concurrent social exchanges, drawing on ongoing interpersonal relationships with a range of individuals (Coleman, 1990). Networks facilitate the flow of a variety of valued resources, ranging from work advice and new ideas to friendship and mentoring. Additionally,

one's network also serves as informational cue about oneself (Podolny, 2001), further influencing the way resources flow. Given these unique features of networks, having a multicultural network is distinct from general exposure to foreign cultures as research on foreign cultural exposure did not explicitly examine how one's surrounding social structure influences creative performance; hence it is useful to better understand the extent to which cultural diversity in social networks facilitate informational resource flow and creative performance. One insight in the present research is that culture-related novel ideas need not originate from culturally different social contacts, debunking the conventional wisdom that one can only learn about other cultures by networking with culturally different others.

Second, if a culturally diverse network indeed enhances creativity, this research sheds light on the generalizability of this effect. Extant research is silent about the type of creative tasks on which network diversity might have positive effects. The assumption is that access to diverse information resources from ones' network enhances creativity in all kinds of tasks that one might engage in. I test this assumption directly by examining how network cultural diversity affect creativity in a range of tasks, some of which do not require access to diverse cultural knowledge. The finding that networks' degree of cultural diversity increases creativity only on tasks that draw on varied cultural-knowledge resources but not on other types of tasks suggests that network diversity's effect on creativity might be more limited than previously thought.

THEORETICAL BACKGROUND AND HYPOTHESES DEVELOPMENT

Creativity is commonly defined as the creation of a new product or idea that satisfies some value functions (Amabile, 1983; Runco, 2004). Creativity research suggests that creative performance often arises from connecting seemingly unrelated existing informational resources (Chua & Iyengar, 2008; Guilford, 1950; Rietzschel, Nijstad, & Stroebe 2007). The more disparate

ideas one is exposed to, the greater the chances for creative combinations. Moreover, exposure to unfamiliar ideas can stimulate new perspectives, resulting in creative problem solving (Leung & Chiu, 2010; Sternberg, 1985; Ward, Smith, & Finke, 1999).

One recent development in creativity research documented links between multicultural experiences and creativity (Antonio, Chang, Hakuta, Kenny, Levin, & Milem, 2004; Cheng, Sanchez-Burks, & Lee, 2008; Leung & Chiu, 2008; Leung, Maddux, Galinsky, & Chiu, 2008; Maddux & Galinsky, 2009). A theme in this emerging body of work is that exposure to different cultures offers access to diverse ideas, promotes openness to new perspectives, and helps people link apparently disparate ideas to generate new ones. Various forms of multicultural exposure have been found to promote creativity. Maddux and Galinsky (2009) found evidence that living abroad and being immersed in a culture different from one's own promotes creative problem solving in general. Leung and Chiu (2010) found that mere exposure to foreign cultural icons in laboratories could also promote creative thoughts. These prior measures of multicultural exposure to some extent imply multicultural networks—for instance, living abroad generates a network of foreign acquaintances—but those studies did not directly examine the effects of multicultural social networks. Thus it remains unclear whether and how multicultural networks influence creativity.

A social network that is comprised of culturally diverse contacts has the potential to increase one's creativity. People from different cultures adhere to different social norms, values, and traditions, resulting in disparate ideas and perspectives on a given problem. In this research, I conceptualize culture broadly to include cultures stemming from both ethnic and national differences. Specifically, drawing on research on cultural psychology, I define culture as the collective programming of the mind that distinguishes members of one group or category of people from others (Hofstede, Hofstede, & Minkov, 2010). Surface-level demographic differences

such as nationality or ethnic background correspond to deeper differences in people's knowledge of the world (Chua et al, 2012; Phillips & Loyd, 2006). Such diverse informational resources when appropriately used can produce creative resolutions to problems encountered in a multicultural world.

Multicultural Networks as Pipes and Prisms

A core feature of social networks is that they serve as conduits or "pipes" for the flow of valued resources between actors (Podolny, 2001; Borgatti & Halgin, 2011; Levine, & Cross, 2004). Prior research has argued that diversity in networks is a source of non-redundant novel information, potentiating creative performance (Burt, 2004; Perry-Smith, 2006; Rodan, & Galunic, 2004). However, new research on access to diverse informational resources revealed a more complex picture on how it affects creativity. Perry-Smith (2014) argued that the type of informational resources matter. Differentiating between information (i.e., data, ideas, and knowledge) and frames (perspectives and interpretations), Perry-Smith (2014) found that non-redundant frames facilitated creativity more effectively than non-redundant information because non-redundant frames encourage expansive thinking by providing different ways to look at a problem. Additionally, where these informational resources come from matters – content derived from weak ties facilitated creativity in general but strong ties appear to enhance creativity only when non-redundant frames are received. It should be noted that Perry-Smith (2014) differentiated between information and frames using experimental manipulations. The distinction between information and frames however can be harder to make when the flow of informational resources occurs naturally. For example, a network contact may provide a new piece of information or new idea that triggers a new frame or perspective on a problem. Nevertheless,
these findings highlight the importance of considering the content and sources of informational resources in social networks when examining their effects on creativity.

What informational resources does a diverse network bring? Diversity in networks can come in different forms. For example, networks can be diverse in terms of gender composition, functional expertise, or cultural backgrounds etc. Current research assumes that diversity in network contacts' background provides diverse informational resources, without specifying the content of these informational resources. Yet, network research has long recognized that networks bring highly specific forms of resources (e.g., Borgatti & Halgin, 2011; Chua, Ingram & Morris, 2008; Cross & Sproull, 2004). Specifically, different types of ties carry different forms of resources, ranging from social support, task advice, to financial aid (Chua et al, 2008). Some researchers have also investigated specific forms of networks by focusing on the flow of particular resources in network ties e.g., friendship networks (e.g., Gibbons, 2004; Gibbons, & Olk, 2003) and advice networks (e.g., Gibbons, 2004; McGrath, Vance, & Grey, 2003). Thus, it behooves organizational scholars to be more specific about the kind of informational resources that diverse networks bring.

This study seeks to further specify the content of information that is received from culturally diverse networks. Culture as a form of diversity is a source of non-redundant information (Nouri, et al 2013). When one's network comprises of contacts from different cultural backgrounds, one is more likely to receive informational resources that stem from different cultural contexts and traditions. For example, if an American has a network contact who is Indian, he or she is likely to receive information or ideas that pertain to Indian culture. Thus, social exchanges with individuals from different cultures in one's network should give one access to a specific form of informational resources: culture-related novel ideas – ideas from other cultures that are unfamiliar to oneself.

However, is it necessarily the case that culture-related novel ideas are only derived from culturally different social contacts? Might individuals from one's own culture also be a source of

novel ideas about other cultures? Research on network diversity often implicitly assumes that novel ideas primarily arise from network contacts who are different from oneself (Baer et al 2015; Fleming et al, 2007; Perry-Smith, 2006; Rodan, & Galunic, 2004). Challenging this assumption, I propose that people with multicultural networks are likely to receive culture-related novel ideas via members of their networks, but the sources of such ideas are *not* necessarily limited to those who are culturally different. A culturally diverse network signals to observers that one is open-minded and highly receptive to foreign cultures, encouraging even same culture others to share culture-related novel ideas with him or her. To give an example, an American who has culturally diverse business associates and co-workers gives the impression that he or she is worldly, cosmopolitan, and open to diverse foreign cultures; this impression in turn increases the likelihood that an American co-worker recently returned from Cambodia would share insights gained from the trip with him or her.

Theoretical foundations for the argument that one's social ties convey information about oneself can be traced back to different lines of psychological theories. For example, Heider's (1958) balance theory argued that someone who is perceived to be the friend of a friend is also likely to be perceived positively because doing so achieves cognitive balance in the triad. Social psychologists have argued that people make known their social connections with positive sources because observers of these connections would evaluate them positively as well (Cialdini, Borden, Thorne, Walker, Freeman, & Sloan, 1976). Specifically, Cialdini's (1989) research on basking in reflected glory shows that, to enhance their public image, people actively seek to display social connections to successful others. Additionally, research on social identity theory also argued that an individual's social connections shape how others perceive him or her, influencing interpersonal behaviors and interactions (Brewer & Gardner, 1996; Tajfel, Billig, Bundy, & Flament, 1971).

In social network research, scholars have similarly recognized that networks not only serves as conduits for resource flow but also a signalling mechanism that conveys important information about the actor (Baum & Oliver, 1992; Kilduff & Krackhardt, 1994; Krackhardt, & Kilduff, 1999; Podolny, 2001). Podolny (2001) argued that firms' network configurations reflect informational cues about their status in the market, signalling the relative quality of their products. Kilduff and Krackhardt (1994) found that being perceived to have a prominent friend in an organization would boost one's performance reputation. Recent experimental research found that the racial diversity of white students' friendship networks is used by black students to form expectations about how they would be perceived (Wout, Murphy, & Steele, 2010). Black students expect to be perceived more negatively by white students whose networks are culturally homogeneous (i.e., all white), and expect more interpersonal challenges in upcoming interactions with such students compared to white students with more culturally diverse social networks. More specific to the current thesis, research by Jang, Ramarajan, and Polzer (2010) found that people with culturally diverse online social networks are perceived to be more creative.

Drawing on this body of research, I argue that a multicultural network does not merely serve the straightforward function of providing conduits to receive new ideas from culturally different others (i.e., pipes) but also provide perceptual cues about individuals' personal characteristics and propensity (i.e., prisms reflecting internal characteristics). A person's network contacts may form impressions of his or her network cultural diversity via multiple pathways. One pathway is through observations – contacts observed that this person frequently socialized or collaborated with many culturally diverse others. Another pathway is through direct interaction with this person who reveals, in one way or another, his or her associations with culturally different others. Finally, contacts may personally know other culturally diverse contacts in this person's network.

Drawing on social identity theory (Brewer & Gardner, 1996; Tajfel, et al 1971), I posit that this impression about one's network cultural diversity, regardless of how it was formed, would shape how he or she is being perceived (in this case, as being cosmopolitan and open to foreign ideas) and encourage network contacts from the same cultural backgrounds as oneself to share culture-related ideas they have acquired elsewhere. Why would a same-culture network contact share culture-related novel ideas with a focal individual who is perceived to be cosmopolitan? Social network research has emphasized that ties need to be maintained after they are established (Borgatti, & Halgin, 2011; Rivera, Soderstrom, & Uzzi, 2010; Uzzi, & Dunlap, 2005). One way to maintain ties is to engage in repeated interactions that sustain the relationship (Chen, 2007; Rivera et al, 2010). Thus, network contacts might be motivated to maintain or even strengthen their ties with a focal individual by sharing ideas that appeals to his or her perceived interests (Byrne, 1961; Moreland & Zajonc, 1982; Wang, & Noe, 2010). Specifically, knowing that the individual is cosmopolitan and interested in diverse cultures, network contacts would likely discuss with him or her culture-related novel ideas that they have received from their own cross-cultural experiences. In these exchanges, novel ideas rather than old ideas about other cultures are more likely to be shared; this is because novel ideas can capture attention, generate excitement, and pique the interests of the other party (Olson, & Evans, 1999; Van Swol, & Ludutsky, 2007), helping to sustain the existing relationship, in part by reducing relational boredom (Aron et al, 2000; Canary et al 1993; Harasymchuk, & Fehr, 2010).

Taken together, the above arguments suggest that, at a *network* level of analysis, the more culturally diverse one's network is, the greater the total number of culture-related novel ideas one is likely to receive from the network. However, the sources of these ideas are not solely limited to culturally different social contacts in the network. Thus, at a *dyadic* level of analysis, I expect that these novel cultural ideas may come from either culturally different or identical social contacts.

Hypothesis 1: At the network level of analysis, the more culturally diverse an individual's network, the more culture-related novel ideas he or she will receive from the network.

Hypothesis 2: At the dyadic level of analysis, the more culturally diverse an individual's network, the more likely he or she will receive a cultural-related novel idea from a given network contact, regardless of whether the contact belongs to one's own or a different culture.

Effects of Network Cultural Diversity on Creativity

The more one's network includes individuals from different cultural backgrounds, the more one has access to and is stimulated by ideas and perspectives different from one's own. The result should be greater creativity. However, it is unclear whether the positive effects of a culturally diverse network on creativity applies to all forms of tasks or only to specific types of tasks that require multiple cultural knowledge. To date, research that investigates the effects of networks on creativity has been silent about the type of task. Many studies used general creative performance ratings by supervisors or observers (e.g., Baer, 2010; Zhou, Shin, Brass, & Zhang, 2009; Rodan & Galunic, 2004; Perry-Smith, 2006), leaving open to interpretation the type of tasks that evaluators had in mind in the rating process. Other studies used expert ratings on ideas generated by study participants in context specific tasks (Burt, 2004) or secondary data such as patents (Lee, Santiago & Chen, 2007) and critics' reviews of creative outputs (Uzzi & Spiro, 2005). For this second group of studies, the "tasks" are specific to the industry being studied (e.g., generating ideas for improving supply chain management or the successful staging of a musical) but it is unclear whether the creativity effects are generalizable to other tasks.

Recent research proposes that the positive effect of multicultural exposure on creativity applies only to tasks that draw on diverse cultural knowledge systems (Cheng et al., 2008). In their study of biculturals (individuals with extensive experience in two cultures), Cheng and colleagues

(2008) argued that the effect on creative performance of multicultural experiences was restricted to tasks belonging to specific cultural domains in which the individual has bicultural experience.

Creativity researchers have similarly argued that creative performance is enhanced by the possession of domain-specific skills and knowledge resources relevant to a given task (Amabile, 1983; Baer, 1993; Rietzschel, Nijstad, & Stroebe 2007). Specifically, Amabile (1983) proposed that familiarity with domain-specific facts, principles, performance "scripts", and technical skills are pre-requisite for creativity in that given domain. Thus, receipt of domain-relevant informational resources from one's network should directly aid individuals to become more creative at tasks in that domain. For any creative task that require drawing on knowledge from diverse cultural sources, culture-related novel ideas are a form of domain-relevant knowledge as such ideas directly inform and stimulate how an individual goes about framing and solving the problem at hand. Specifically, ideas from diverse cultures prompt the individual to engage in more elaborate processing of culture-relevant information (i.e., deeply considering and integrating different cultural ideas and perspectives), directly benefiting the search for creative solutions (van Knippenberg, De Dreu, & Homan, 2004). For example, when creating a new fusion cuisine that combines ingredients from East and West, a chef's knowledge about diverse cultures are highly relevant and can be directly applied to the task by informing, stimulating, and guiding the chef in his or her search for a new recipe. However, when the task at hand does not require diverse cultural knowledge (e.g., devising a new effective way to clean vegetables), diverse knowledge about other cultures that one draws from one's social network would be less useful. Thus, one might expect the positive effect of a culturally diverse network on creativity to be highly domain-specific. Because a multicultural network facilitates the flow of specific types of informational resources relating to other cultures, increasing one's stockpile of cultural knowledge, its effect

should be primarily applicable to task domains that require knowledge and ideas from multiple cultures.

Other research however suggests that the effects of multicultural exposure on creativity are generalizable to all kinds of creative endeavors. Tadmor and Tetlock (2006) argue that multicultural experiences help individuals recognize and integrate viewpoints grounded in diverse cultures, and consequently enhance their ability to tolerate and even reconcile conflicting ideas and perspectives. Leung and colleagues (2008) propose that exposure to foreign cultures may also challenge or expand an individual's routine knowledge structure by providing a new perspective toward problem solving, spurring divergent thinking. These claims are consistent with Perry-Smith's (2014) argument that novel frames derived from social networks can enhance creative problem solving. Indeed, some cross-cultural psychologists have found evidence that multicultural exposure improves performance on a wide variety of tasks, including negotiation, idea generation, remote association of ideas, and even tasks such as drawing depictions of aliens (Leung & Chiu, 2008; Leung & Chiu, 2010; Maddux & Galinsky, 2008). Taken together, these studies suggest that if multicultural networks indeed increase creativity, it might well be generalizable to a range of creative tasks.

Drawing on these two lines of argument and associated empirical evidence, I investigate two competing hypotheses. One is that individuals with more culturally diverse networks will be more creative, but primarily at tasks that draw on multiple cultural-knowledge systems. The alternative hypothesis is that individuals with more culturally diverse networks will be creative at a broad range of tasks that may not require cultural knowledge, because such networks provides novel frames and perspectives to look at problems, enhancing creative thinking in general.

Hypothesis 3a: The positive effect of cultural diversity in an individual's network on his or her creativity is restricted to tasks that draw on knowledge resources from multiple cultures.

Hypothesis 3b: The positive effect of cultural diversity in an individual's network on his or her creativity applies to a broad range of creativity-related tasks and is not restricted to tasks that draw on knowledge resources from multiple cultures.

I conducted two studies to test these above hypotheses. In Study 1, a laboratory experiment, I test hypotheses H1 and H2 to shed light on the content and sources of informational resources that are derived from culturally diverse networks. In addition, I test the competing hypotheses H3a and H3b about the domain-specific effects of multicultural networks on creativity. Specifically, I investigate the impact of network's cultural diversity on tasks that require (a) knowledge about multiple cultures from around the world, (b) knowledge about a given local culture, and (c) little knowledge about any particular culture. Study 2, replicates the effects found in Study 1 for H3a and H3b in a field setting to increase external validity.

METHOD

Study 1

Participants and Procedure

Two hundred and ten students (83% Americans, 50 percent male, average age 21) recruited from subject pool at a large east-coast university in the U.S. completed a two-part study for compensation (US$20). Fourteen percent identified themselves as African-Americans, 14 percent as Asian-Americans, 48 percent as European-Americans, and 7 percent as Latino; the rest were affiliated with other ethnic groups (e.g., East Asian, Middle Eastern).

The first part of the study involved a social network survey. Specifically, participants were asked to provide details about their social networks at the university. Participants listed an average of 11.6 network contacts. For each contact, participants furnished further details such as cultural background and gender, as well as nature of their relationships (e.g., frequency of interaction and duration known). The existence of relationships among listed contacts was indicated by filling in a half-matrix, each cell of which represented a relationship between two contacts. Participants indicated "1" in each cell if the two contacts know each other, "0" otherwise. This method of asking respondents whether or not two social network contacts know each other has been used in prior research (e.g., Chua, 2013; Chua, Morris, & Ingram, 2009; Chua, Ingram, & Morris, 2008). In the second part of the study, participants were asked to generate ideas for an advertising campaign. These two tasks are separated by an unrelated filler task involving a word puzzle that took about 10 minutes. All of these tasks were completed online at the university laboratory. The online program is designed such that participants must complete each given task before they can proceed to the next one.

Tasks. The second part of the study was presented as unrelated to the network survey. I asked participants to generate ideas for an advertisement introducing a new brand of fruit-flavored water called "Berrie." Participants were randomly assigned to one of three experimental conditions, each representing a variation of the task. In the *local* condition, participants were told that the advertisement would be used at a local sports event attended by athletes and spectators from various counties within their state in the U.S. In the *global* condition, participants were told that the advertisement would be used at a sports event attended by athletes and spectators from countries representing every major continent. In both conditions, I told participants that the ideas they generated should be innovative and that the advertisement should appeal to as many athletes and spectators as possible. Finally, in the *imagination* condition, participants were told to draw

consumers' attention to "Berrie," and to introduce the drink in an unconventional way. Their task was to generate as many unusual ways as possible to describe each of the four fruits (apple, cherry, kiwi, and strawberry) used in the drink. In sum, these tasks represent contexts that required different amount of knowledge about specific cultures: one local cultural knowledge, knowledge about multiple cultures around the world, and little cultural knowledge respectively.

To check that these tasks were distinctive, I conducted a pre-test involving 55 participants who did not complete this study. These participants (38.2% male; average age 28.5) were recruited online from Amazon MTurk to pretest our instruments for the current study as well as Study 2 (see later). The participants included students (3.6%) as well as professionals who held a wide variety of jobs such as business manager, IT analyst, engineer, medical assistant, librarian, and website designer etc. Participants were presented with each of these idea-generation tasks in random order and asked a series of questions regarding what it would take to perform each task effectively – (a) extent that the task requires having knowledge about multiple cultures from around the world, (b) extent that the task requires having significant local knowledge about a particular local metro area in the country, (c) extent that the task requires little knowledge of any particular culture around the world including the U.S., and (d) extent that the task requires creative thinking. I also asked participants to rate the level of difficulty for each task. All questions were answered on a 7-point scale (1=strongly disagree; 7=strongly agree). Results indicated that the local task was perceived to require greater knowledge about a given local culture (i.e., about a specific state in the U.S.) compared to the other tasks ($F(2,52) = 12.70$; $p < 0.01$); the global task was perceived to require knowledge of multiple cultures from around the world more than the other two tasks ($F(2,52) = 17.58$; $p < 0.01$); and the *imagination* task was perceived to require less cultural knowledge of any form than the other tasks ($F(2,52) = 4.88$; $p < 0.05$). The three tasks did not differ in terms of perceived level of difficulty ($F(2, 52)= 1.30$, $p > 0.10$) or the extent to which creative thinking was

required ($F(2,52) = 2.21$, $p > 0.10$).

Measures

Network cultural diversity. I measured the degree of cultural diversity in participants' network using Blau's (1977) heterogeneity index, computed based on the function *1 – Σ i (Squared (proportion of category i))*, where i is the proportion of the cultural group in the i^{th} category. The cultural groups represented include European-American, African-American, Asian-American, European, East-Asian, Middle Eastern, Latino, and other.

Creativity. Two peer raters (recruited from the same subject pool) blind to the hypotheses and the identities of the participants independently used a 7-point scale to judge the extent to which each idea was (a) novel, (b) unique, (c) unconventional, and (d) creative. Raters were told that a creative advertising idea is both new and effective in inducing purchase of the drink. I included measures of conventionality and uniqueness because the *imagination* task required participants to generate unconventional ways to describe four fruits. These two measures are relevant to the other two tasks as well. Correlations between the two raters on the four evaluation criteria were all above 0.70. Cronbach's alphas for this 4-item measure were above 0.90 for both raters. Hence, I combined these scores to derive a creativity index for each participant.

Receipt of culture-related novel ideas. Besides detailing their relationships to each listed contact, participants also supplied the most novel idea they had heard from each contact within the preceding three months. Participants were asked to describe the idea in as much detail as possible. The aim is to tap the range of the content of the novel ideas that participants receive from their networks. I focused on the most novel ideas because such ideas are more vivid and thus easier to recall with accuracy than less novel ones. Whether or not these ideas were objectively novel was immaterial. The governing assumption is that the ideas were novel to the participant, and the aim

was to categorize them based on their content. Participants completed this step as part of the network survey before they begin working on the idea generation task.

A research assistant first read all the ideas for an overview of the key categories represented; a basic set of categories was then generated. If distinctions within categories emerged during coding, new categories were created and all items in the obsolete category were recoded using the new categories. In total, 15 major categories emerged (examples include culture, academic advice, general knowledge, business opportunities, and philosophy of life). If an idea spanned multiple categories, it was coded as belonging to all such categories (e.g., "Studying abroad to gain better perspective on the subject of theater in country X" would be coded under both "academic advice" and "culture"). Another assistant completed the same coding and differences were resolved by discussion.

Given my thesis that the effect of multicultural networks on creativity hinges on the exposure of individuals with culturally diverse networks to ideas and perspectives from other cultures, culture-related ideas are of key interest. Ideas were coded as culture-related if they contained elements touching on cultures, race, or countries outside of the U.S. Examples of ideas coded as culture-related include "singing traditional Urdu songs in Farsi," "Hong Kong culture and interesting facts about places she has traveled recently (Vietnam, India)," and "Samoan cultural information." I created a dummy variable for each idea (coded this variable 1 if it was related to culture and 0 otherwise). I also summed the number of culture-related new ideas that each participant received from across the listed network contacts.

Cultural difference between participants and their contacts. I compared the participant's self-reported cultural background with that of each contact to derive a dummy variable (coded "1" if different and "0" if the same).

Control variables. I controlled for participants' past cultural experience, network density, network size, and years of work experience (if any). At the dyadic level, I also controlled for the nature of relationship between participant and each contact; participants indicated what resources (economic, friendship, task advice, or career advice) they obtained from each contact as well as the frequency of interaction and closeness. I averaged frequency and closeness to derive a measure of dyadic tie strength. Network scholars have argued that embeddededness in network fosters the sharing of information (Reagans and Zuckerman, 2001; Uzzi and Lanchester, 2003). Thus I controlled for a given contact's embeddedness - the number of observed ties between him or her and other network members divided by the total number of possible ties with other members (excluding the participant).

Analyses and Results

I analyzed the data at both the participant and dyadic (participant-contact) levels. The participant-level dependent variables are (a) the degree of creativity exhibited in the task of generating ideas for an advertisement and (b) the total number of culture-related novel ideas received from network contacts over the preceding three months. The dyadic-level dependent variable is whether or not a participant received a culture-related novel idea from a given contact within the preceding three months.

For the participant-level (i.e. network level) analysis of creative outcomes I use ordinary-least-square regression. I used contrast coding to capture the three types of task. Specifically, I used two indicators: (a) *Global versus imagination* (coded 1, 0, and -1 for the global, local, and imagination conditions respectively) to represent the comparison between the global task and the imagination task, and (b) *Global versus others* (coded 2, -1, and -1 for the global, local, and imagination conditions respectively) to represent the comparison between the global task and the

other two tasks. The latter indicator is of key interest as it allows me to test hypotheses H3a and 3b.

I also test whether the degree of cultural diversity in networks influence the number of culture-related novel ideas which participants receive from their network contacts. Because this dependent variable is a count measure, I used negative binomial regression for this analysis. For the dyadic-level analyses the dependent variable is binary, with a value of 1 if a culture-related novel idea is received from a given contact and 0 otherwise. Because the data contain hierarchically nested variables (up to 15 dyadic relationships are nested with a given participant), non-independence of observations is a methodological concern (Hausman, Hall, and Griliches, 1984; Klein, Dansereau, and Hall, 1994). In response, I used STATA's *probit* regression with robust cluster on the participant to control for the influence of a given participant on multiple observations. This approach allows for estimating dyadic-level effects within egocentric networks (Hoffman, Griffin, and Gavin, 2000) and estimate effects for key participant-level variables, particularly the degree of cultural diversity in the network.

Insert Table 1 and 2 about here

Table 1 presents the descriptive statistics. I first test whether the cultural diversity of participants' networks predicts the type of novel ideas they receive from contacts in their networks. Table 2 presents the results. As I predicted, cultural diversity in participants' networks has a positive effect on the total number of culture-related novel ideas received ($b = 1.27$, $p < 0.05$). But network cultural diversity had no effect on receipt of other types of novel ideas; results for a sample selection of these idea categories (e.g., leisure and general knowledge, etc) appear in Table 2.

To pinpoint the sources of culture-related novel ideas, I further analyzed the data at the dyadic level, controlling for a host of participant/contact variables. Table 3 shows that the cultural diversity of participants' networks significantly predicts the likelihood that a culture-related novel idea is received from a network contact ($b = 0.60$; $p < 0.05$). Importantly, the receipt of culture-related novel ideas is not predicted by whether or not the other person is culturally different ($b = 0.11$; $p > 0.10$). Nor does network cultural diversity have any effect on the likelihood of receiving novel ideas of other types. For example, higher network cultural diversity does not predict receipt of a novel idea regarding business opportunities ($b = 0.07$, $p > 0.10$). Results for a sample selection of these idea categories appear in Table 3. Overall, these results indicate that individuals whose networks are highly culturally diverse are more likely to receive culture-related novel ideas but not other types of ideas; culture-related novel ideas do not necessarily come from culturally different network contacts. Thus there is support for hypotheses H1 and H2.

Table 4 reports the effects of the degree of network cultural diversity on creativity. Model 1 presents the effects of network cultural diversity and the key control variables. Model 2 adds the predictors for different types of tasks. In neither model did network cultural diversity exhibit any significant main effect on creativity. Model 3 adds the *Network cultural diversity* x *Global versus others* interaction term to test whether network cultural diversity predicts creativity only for a task that requires a global perspective. This interaction was significant in the expected direction ($b = 0.45$; $p < 0.05$). Specifically, network cultural diversity positively predicts the creativity of proposed ideas for the global condition ($b = 1.12$, $p < 0.05$) but not for the local ($b = -0.51$, $p = 0.40$) or imagination conditions ($b = -0.21$, $p = 0.75$). This pattern of interaction is depicted in Figure 1. This finding supports the hypothesis that a multicultural network promotes creativity only on tasks that require knowledge and ideas from multiple cultures (H3a).

Insert Table 3 and 4 about here

Finally, I conducted further tests to see whether the number of culture-related novel ideas that participants received from their networks mediates the effect of network cultural diversity on creative performance. Although network cultural diversity has a positive effect on both the number of culture-related novel ideas received ($b = 0.57$; $p < 0.05$) and creativity in the global-condition task, which requires drawing on other cultural-knowledge resources ($b = 1.12$ $p < 0.05$), the mediation effect was not significant. Specifically, when I added the number of culture-related novel ideas that each participant received into a model that regressed creativity on network cultural diversity in the global-condition task, the effect of network cultural diversity on creativity remained positive and significant ($b = 1.24$; $p < 0.05$). I discuss this finding in the discussion section.

Study 2

Study 1 tests the hypotheses that individuals with multicultural networks are more likely to receive culture-related novel ideas, and that these ideas are not necessarily conveyed by network contacts who are culturally different (hypotheses H1 and H2). Study 1 also provides the first evidence that the effect of a network's cultural diversity on creativity is domain-specific (supporting hypotheses H3a but not H3b). Study 2 seeks to replicate the effects of multicultural networks on creative performance demonstrated in Study 1 (i.e., hypothesis H3a and H3b) using a different sample, namely a pool of working professionals tasked to tackle a major challenge in their profession. A strength of Study 2 is its external validity as the participants were drawn from a field context involving a real-world problem that participants cared deeply about.

Participants and Procedure

This study combines network analysis and experimental design in a field setting. Seventy-two media professionals (48 percent male, average age 51.6), all members of a private club for journalists and communications professionals in a large, east coast, U.S. city, participated in this study. At the time of the study, the club has 3392 members, of which 30% are non-Americans (9.6% are below 35 years old and 21% are above 65 years old). Eighty-two percent of the participants identified themselves as European-Americans, 6.4 percent as African-Americans, 4 percent as Europeans, and 2.1 percent as Latino; the remainder belonged to other ethnic groups (e.g., Asian-American, East Asian, Middle Eastern). All participants were working and living in the United States at the time of the study. These participants voluntarily completed an online survey with the chance of winning a $100 dining voucher at the club's restaurant. The survey was promoted as an effort to better understand members' interactions at the club, and to solicit their opinions about the ongoing public debate on the future of the newspaper industry.

The first part of the study called for completing a social-network survey similar to that in Study 1. The survey asked participants to list up to 15 contacts whom they deemed most important in their professional networks. The upper limit was set to keep the length of the survey manageable in the field setting at hand. Contacts could reside in any context and need not have been employed by a participant's current or previous employer. Participants listed an average of 8.7 contacts. For each contact, participants furnished details such as cultural background and gender, as well as nature of their relationships (e.g., frequency of interaction and duration known). As in Study 1, the existence of relationships among listed contacts was indicated by filling in a half-matrix, each cell of which represented a relationship between two contacts. Participants indicated "1" in each cell if the two contacts know each other, "0" otherwise. The second part of the survey solicited participants' thoughts on the future of the newspaper industry in open-response format. At the time of the study, the future of the newspaper industry and of journalism

had been subjects of widespread public debate.

Tasks. In the second part of the survey, which solicited participants' thoughts on the future of the newspaper industry, I used a between-subject experimental design wherein participants were randomly assigned to one of three conditions, each representing a variation of the task. In the *local* condition, participants were asked to imagine that they ran a local newspaper serving a medium-sized metropolitan are in the U.S. with a daily circulation of 150,000. The task was to propose a novel business model that addressed the newspaper's current challenges with a focus on how to collect and disseminate news and information while making the newspaper profitable. In the *global* condition, participants were asked to imagine that they ran a wire service that collected and disseminated news around the world. The task was to propose a novel business model addressing the wire service's current challenges. I used the term "wire service" here because discussions with the management of the club suggested that the notion of a global wire service makes more sense to media professionals at the club than the notion of a global newspaper – there is no newspaper that would be truly considered as global by journalists. Finally, in the *imagination* condition, participants were asked to imagine and describe how a typical newspaper will be run 50 years in the future, focusing on how it collects and disseminates news and information. These three variations allowed me later to measure creativity in a range of task contexts that require different amount of cultural knowledge: (a) a local context that requires mainly local cultural knowledge and does not call for any knowledge about other cultures, (b) a global context requiring global perspectives and hence knowledge about multiple cultures, and (c) an abstract context (envisioning a distant future) that does not necessarily require any form of cultural knowledge. Specifically, the local and imagination conditions provide two forms of test for alternative accounts to hypothesis H3a – one examines the effects of network cultural diversity on a task that primarily requires knowledge about only *one* culture whereas the other examines effects on a task that requires little

knowledge about any culture. The imagination task can also be construed as one that tests general creativity.

A pre-test similar to the one administered in Study 1, involving the same 55 pre-test participants who did not complete the study, revealed that the tasks were distinctive - the *global* task was perceived to require multiple cultural knowledge more than the other two tasks ($F(2,52) = 36.69$; $p < 0.01$); the *local* task was perceived to require greater local cultural knowledge compared to the other two tasks ($F(2,52) = 15.54$; $p < 0.01$); and the *imagination* task required little cultural knowledge of any sort compared to the other two tasks ($F(2,52) = 12.25$; $p < 0.01$). The three tasks did not differ in terms of level of difficulty ($F(2,52) = 1.98$; $p > 0.10$) or the extent to which creative thinking was required ($F(2,52) = 0.95$; $p > 0.10$).

Measures

Cultural diversity in participants' networks. As in Study 1, I measured the degree of cultural diversity in participants' networks using Blau's (1977) heterogeneity index. In this study, the categories are different cultural groups designed to fit the profile of the club's membership; there were eight such categories (European-American, African-American, Asian-American, European, East-Asian, Middle Eastern, Latino, and other). These cultural categories include cultures arising from both ethnicity (e.g., Asian-American) and nationality (e.g., East-Asian). It is important to note that even though the club's membership is culturally diverse, individuals forge network ties with people from other cultures to varying degrees.

Creativity. The creativity of the proposals regarding the newspaper industry was assessed by an expert rating method based on Amabile's (1982) consensual assessment technique. All proposals generated in the study were evaluated by three media professionals (all experts in the field, including a consultant who runs his own media consulting firm and two journalists with experience in major newspapers) who did not participate in the study. These raters indicated on a

7-point scale the extent to which they perceived each proposal to be (a) novel, (b) fresh, and (c) creative. Raters were told that a creative idea is one that is both new and effective in addressing the issue at hand. Reliability among the three raters for these items was 0.73, 0.77, and 0.78, respectively. Given the reasonable reliability of each item, I averaged the scores across the three raters to derive a mean score for each proposal. Reliability among these three averaged items is high with Cronbach's alpha at 0.98. I took the average of these three items to derive an overall creativity score.

Control variables. Various other forms of diversity (both in terms of individuals' experiences and demographics) may influence the results. For instance, research in cultural psychology has found that living overseas can increase creativity (Leung et al, 2008) whereas network research documents that dense networks predicates redundant information (Burt, 2004). Moreover, people with larger networks or more work experience may have access to more disparate ideas. Thus, I controlled for the following variables: (a) past foreign experiences (i.e., the number of countries outside the United States that participants had visited or lived in, and the duration of their stays), (b) work experience (in years), (c) network size (in terms of number of contacts listed), and (d) network density (derived by dividing the number of reported connections among contacts by the total number of potential connections among contacts). Additionally, I controlled for participants' age and gender.

Analyses and Results

I analyzed the data at the participant (ego) level using ordinary-least-square regression. To test the effects of network cultural diversity on different types of creative tasks, I used the same form of contrast coding in Study 1 to capture the three types of tasks.

Table 5 presents the descriptive statistics for and correlations among the key variables. Table 6 presents results of the effects of a network's degree of cultural diversity on creativity.

Model 1 shows the effects of network cultural diversity and the key control variables. Model 2 adds the predictors for the different types of tasks (*Global versus imagination* and *Global versus others*). Network cultural diversity did not show any significant main effect on creativity in either model. Model 3 adds the *network cultural diversity x global versus others* interaction term to test whether network cultural diversity predicts creativity only for a task that requires a global perspective. This interaction was significant in the expected direction ($b = 1.45$; $p < 0.05$). Specifically, network cultural diversity positively predicts the novelty of proposed ideas for the global condition ($b = 4.00$, $p < 0.05$), but not for the local ($b = 0.49$, $p = 0.76$) or imagination ($b = -0.30$, $p = 0.86$) conditions. Figure 2 shows the graphical depiction of this interaction effect. Taken together, these results suggest that cultural diversity in networks increases creativity only for tasks that require drawing on knowledge from multiple cultures. Cultural diversity in network has no effect on task that requires knowledge about only one culture or does not involve any cultural knowledge whatsoever. In sum, hypothesis H3a, but not H3b, is supported.

Insert Table 5 and 6 about here

DISCUSSION

This research examines how cultural diversity in social networks influences the flow of ideas and individuals' creativity. I found that the more culturally diverse one's network, the more likely one is to receive culture-related novel ideas but not other types of novel ideas from network contacts; interestingly, these culture-related novel ideas do not necessarily come from contacts who are culturally different. Novel ideas about foreign cultures might come indirectly from same-culture network contacts. Additionally, I found evidence that the degree of cultural diversity in networks exerts a positive effect on creativity for tasks that draw on varied cultural-knowledge

resources. For other tasks, network cultural diversity had no significant effect on creative performance.

Theoretical Implications

This research makes several theoretical contributions. First, the finding that the effect of multicultural networks on creativity applies only to some types of tasks but not others contributes to creativity research. Although creativity scholars have long documented the effects on creativity of various individual characteristics (e.g., personality) and contextual factors (e.g., environmental stimuli and social network) (see Zhou & Shalley (2008) for a review), this literature has generally not paid much attention to the contexts in which creativity is required (Zhou & Su, 2010). Findings from this research revisit an often neglected line of inquiry for creativity researchers – under what task contexts do known drivers of creativity exert their effects? The current findings provide evidence that the effects of known drivers of creativity (in this case, network diversity) may not be exerted across all contexts.

Second, the present findings contribute to network research by showing that the effects of certain network properties such as the degree of diversity might well be domain specific. Multicultural networks promote the flow of culture-related novel ideas more than other types of ideas, resulting in benefits only for creative tasks that draw on multiple cultural knowledge systems. Existing network research seldom differentiates types of outcomes or explicitly examines specific domains in which network variables exert an impact (Baer et al, 2015). Although the flow of diverse ideas and information is a commonly theorized mechanism underlying the effects of various network properties and creative performance (Burt, 2004; Perry-Smith, 2006; Rodan & Galunic, 2004), the content and sources of these ideas were also seldom examined. The present research looks into these issues. A key finding is that culturally diverse networks appear to promote the flow of culture-related novel ideas both *directly* (from different-culture network

contacts sharing ideas about their own or other cultures) and *indirectly* (from same-culture network contacts sharing ideas about foreign cultures they have encountered). The finding that culture-related novel ideas might come from same-culture social network contacts is of theoretical importance because it challenges the implicit assumption that novel ideas arise primarily from network contacts who are different from oneself. Additionally, effects of network diversity are likely to be contingent on the types of task. Taken together, these findings compel network research to build more nuanced theories by more explicitly specifying the conditions under which proposed network effects are expected to occur as well as the type of information and ideas that flow in the networks.

Third, the findings in the present research also speak to diversity research in general. Extant research on organizational and team diversity has found mixed results (Williams & O'Reilly, 1998; Hoever, et al 2012). A body of research has found positive effects of team cultural diversity on creativity (McLeod, Lobel, Cox, 1996; O'Reilly, Williams, & Barsade, 1998). However, some research on functional diversity found no significant effects on organizational innovation (Sethi, Smith, & Park, 2001). To date, research linking diversity and creativity seldom distinguishes the different types of creative tasks when investigating diversity's effect on creative performance. One possible explanation that the present research offers is that diversity's effect on creativity and innovation is highly contingent on the type of diversity and whether or not the diverse informational resources it confers on the innovators are relevant to the tasks at hand.

Fourth, the present research contributes to a growing body of work that links multicultural experiences and creativity (Leung & Chiu, 2008; Leung et al., 2008; Maddux & Galinsky, 2009). Prior measures of multicultural experiences such as living abroad tend to conflate many different types of cultural exposures (e.g., making foreign friends, eating foreign food, exposure to foreign cultural icons, and experiencing local customs etc). Theories about the specific forms that cultural

diversity takes—whether in the form of team composition, network profile, or past experiences—and about the associated mechanisms and boundary conditions that underlie its effects on creativity, are also still developing. It is therefore unclear exactly what aspects of multicultural experiences accounted for the observed increase in creativity in prior studies. This research identifies multicultural network as a specific channel from which one could gain cultural knowledge that matters for creativity.

The finding that multicultural networks did not engender creativity in different types of tasks appears to run counter to an earlier finding that living abroad has broad implications for creativity (Maddux & Galinsky, 2009). One explanation is that living abroad and having a multicultural network are qualitatively different multicultural experiences. Living abroad provides an intense firsthand experience of immersion in and adaptation to a foreign culture. Such an experience may well have a deep influence, permanently altering one's cognitive habits and promoting creative thinking ability in general. By contrast, a multicultural network represents relatively low-intensity, vicarious, but persistent and simultaneous, exposure to a range of cultures. An individual can engage or disengage network members at will, but they remain available to consult when the need arises. Ideas and perspectives gleaned from culturally diverse network members might be experienced vicariously through conversations with one's social contacts and thus not as deeply imprinted compared to those that one experienced firsthand. Overall, my findings, when taken together with extant findings, suggest that the effects of multicultural experiences on creativity likely depend on the specific type of exposure. Thus, researchers should be specific about the type of multicultural exposure when investigating how multicultural experiences shape creativity. Future research could also explore the specific conditions under which a generalized effect of cultural diversity on creativity would materialize.

Practical Implications

This research has practical implications for managers and employees in the era of globalization. Creating a multicultural workplace is often touted as a strategy to foster organizational creativity. This advice, though intuitively appealing, should be selectively prescribed. Managers can most realistically expect enhanced creative performance from a multicultural workforce on tasks that call for combining ideas and knowledge from different cultural perspectives. On other types of task, the effects on creativity of having a culturally diverse workforce would probably be more uncertain and indirect; managers might be better served in these situations to seek other drivers of creativity to improve creative performance.

Understanding how multicultural networks foster the flow of culture-related novel ideas can nevertheless provide managers some additional tools for increasing organizational creativity. For instance, managers could create more opportunities (such as organizing an "international day" event) for employees of different cultures to exchange ideas. Managers could also explore how to better enable the flow of ideas across cultural lines. A recent study found trust to be a key facilitator of intercultural idea exchange (Chua, Morris, & Mor, 2012). Hence, creating an organizational climate that fosters psychological safety and trust would be especially helpful. Beyond learning from culturally different others, the present research also suggests that one can learn culture-related novel ideas from one's own countrymen if one has a multicultural network. The finding from hypothesis H2 highlights to individuals that as they strive to develop creative ideas by drawing on culturally diverse ideas from their networks, they should not ignore social contacts from their own cultures as potential sources of novel ideas about other cultures. As people's exposure to multiple cultures increases due to globalization, social contacts from one's own culture could very well provide oneself with novel ideas about other cultures that could translate into creative performance.

Limitations and Future Research

As with all research, the studies reported here have limitations. In hindsight, the measurement of novel-idea flow, although supportive of testing certain hypotheses (H1 and H2), was inadequate to capture the flow of ideas between individuals fully enough to test how creative performance on particular tasks comes about. My method relied on participants to select the ideas they wished to report, and was thus subject to recall biases and social-desirability biases. For example, participants might have reported not the most novel ideas but those that impressed them most strongly. Or a controversial or provocative idea might have gone unreported. These limitations might partially explain why the number of cultural-related novel ideas did not significantly mediate the effect of network cultural diversity on creativity. Nevertheless, my methodology represents a starting point for research to examine the content and sources of ideas that flow in networks. Future research could build on my methodology to improve idea-reporting measurement.

The precise mechanisms underlying the relationship between culturally diverse networks and creativity deserve further investigation. Although extant research provides evidence that people with multicultural networks are perceived to be more creative (Jang et al 2010), it would be useful to explicitly measure and demonstrate that how focal individuals are perceived predicts whether others are more likely to share novel ideas with them. For example, future research could ask network contacts to report on their perceptions of whether a focal individual is indeed cosmopolitan and open to new foreign ideas.

Researchers should also investigate other accounts that seem plausible. Specifically, there are alternative accounts as to why individuals with culturally diverse networks might receive culture-related novel ideas from same-culture social contacts. In my theory development, I argued that same-culture network contacts share culture-related novel ideas with a focal individual so as

to maintain existing ties by appealing to the perceived interests of this individual. One alternative explanation could be that the focal individual, because of his or her exposure to diverse cultures in the network, might become adept at extracting culture-related novel ideas from network contacts – regardless of their cultural background. Another explanation could be that homophily plays a role. That is, when a focal individual has a culturally diverse social network, he or she might be drawn to same-culture network contacts who also have such networks. The confluence of common interests in diverse cultures would promote an exchange of culture-related novel ideas. These explanations are not mutually exclusive with my central thesis. In all likelihood, an individual's multicultural network potentially promotes a two way process of receiving as well as extracting culture-related novel ideas from a range of network contacts regardless of their cultural backgrounds.

Relatedly, a research direction worth exploring is whether having a multicultural network has any effect on individuals' intercultural competence. If multicultural networks indeed increase intercultural competence, what role does an individual's intercultural competence play in improving creativity? Recent research on cultural intelligence and creativity suggests that cultural metacognition—reflective thinking about one's own cultural knowledge and assumptions—might be a crucial determinant of whether intercultural interaction promotes creativity (Chua, Morris, & Mor, 2012). One hypothesis is that individuals with high cultural metacognition are better positioned than others to reap the benefits of multicultural networks because they are better able to track and monitor opportunities for cultural cross-fertilization. For example, individuals with high cultural meta-cognition might be more sensitive and receptive toward culture-related ideas and these individuals might actively solicit such ideas from their networks. Future research could quiz research participants on whether or not they actively seek out certain ideas or information from their social networks. Alternatively, it is plausible that individuals with high intercultural

competence are more likely to develop multicultural networks and share culture-related ideas with their network contacts, prompting them to reciprocate by sharing other culture-related ideas from their own experiences.

In the present research, I did not measure openness to experience as a personality antecedent to creativity but prior research has found some links (e.g., Leung and Chiu, 2008). Individual differences are not a major concern in this paper because I used an experimental approach based on randomization of participants into different experimental conditions. Participants in each experimental condition are therefore likely to have a range of openness to experience tendencies. However, future research can explore whether there is potential interaction between openness to experience, types of tasks, and network cultural diversity on creativity. Perhaps individuals high in openness to experience might be better able to harness the power of a culturally diverse network when the task at hand calls for drawing on knowledge from diverse cultures. Individuals with greater openness to experience might also be more likely to develop and maintain culturally diverse networks; thus, it would be useful to control for this variable in future research.

Another potential limitation to the present research is that the samples in both studies are drawn from the U.S. Yet, using an U.S.-centric sample should not have any significant implications on my central thesis. My focus is on individuals' networks and the extent to which they are culturally diverse. The U.S. is a highly culturally diverse country and there are significant variations in the degree of cultural diversity in the participants' networks. Moreover, in all my analyses, I have controlled for participants' overseas experiences, work experiences, age, and gender. In Study 1, I also controlled for the individual contact's gender and culture for the dyadic level of analyses. Nevertheless, future work could draw on a more international sample to see if the results hold up elsewhere.

CONCLUSION

This research, combining social network analyses and experimental approaches in both field and laboratory settings, presents the first empirical evidence on how maintaining a multicultural social network facilitate the flow of novel ideas and increase individuals' creative performance. The finding that cultural diversity in networks promotes creativity only for certain types of tasks has theoretical implications for creativity, network, and diversity research.

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TABLE 1: Study 1 Descriptive Statistics and Correlations (dyadic level)

Variable	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9	10
1. Creativity[a]	2.96	1.19	1.08	6.03	1.00									
2. Network cultural diversity	0.39	0.23	0	0.83	-0.03	1.00								
3. Contact provides culture-related novel idea	0.05	0.22	0	1	-0.01	0.07*	1.00							
4. Network size (number of contacts)	11.62	3.13	6	15	-0.12*	0.01	-0.02	1.00						
5. Network density	0.53	0.27	0	1	0.04	-0.09*	-0.01	-0.11*	1.00					
6. Contact's embeddedness	0.53	0.32	0	1	0.03	-0.07*	-0.00	-0.09*	0.86*	1.00				
7. Number of countries lived in (6 months or more)	0.15	0.41	0	2	-0.06*	0.05*	0.01	0.08*	-0.01	-0.01	1.00			
8. Participant's work experience	3.17	3.22	0	16	-0.04	-0.15*	-0.04	0.11*	-0.07*	-0.06*	-0.01	1.00		
9. Contact is of different culture	0.40	0.49	0	1	0.01	0.41*	0.05*	0.00	-0.05*	-0.07*	0.01	-0.09*	1.00	
10. Contact is of different gender	0.35	0.48	0	1	0.02	-0.01	0.00	0.01	-0.07*	-0.06*	-0.00	0.06*	-0.02	1.00
11. Contact is source of economic resources	0.16	0.37	0	1	0.08*	-0.08*	0.01	-0.05*	0.06*	0.11*	-0.05*	0.05*	-0.11*	0.08*
12. Contact is source of career guidance	0.36	0.48	0	1	0.04	-0.00	0.03	-0.06*	-0.05*	-0.05*	-0.03	-0.03	0.00	0.03
13. Contact is source of task advice	0.53	0.50	0	1	0.07*	-0.01	0.02	-0.02	-0.08*	-0.03	-0.04	-0.06*	-0.04*	-0.05*
14. Contact is source of friendship	0.86	0.34	0	1	-0.01	-0.06*	0.00	0.08*	0.13*	0.17*	0.06*	-0.01	-0.06*	-0.07*
15. Tie strength	1.86	0.76	1	4	-0.02	0.04	-0.02	0.05*	-0.23*	-0.33*	0.01	0.15*	0.07*	0.05*
16. Participant's gender (male)	0.48	0.50	0	1	0.05*	0.05*	-0.01	-0.11*	0.16*	0.13*	0.04	-0.07*	0.06*	-0.12
17. Participant's age	21.27	2.73	18	30	-0.10*	-0.12*	-0.05*	0.08*	-0.14*	-0.12*	0.07*	0.59*	0.00	0.06*
18. Time spent abroad (in months)	19.38	46.46	0	306	-0.07*	0.23*	0.07*	-0.01	0.05*	0.05*	0.30*	0.00	0.12*	0.01

	11	12	13	14	15	16	17	18
11. Contact is source of economic resources	1.00							
12. Contact is source of career guidance	0.36*	1.00						
13. Contact is source of task advice	0.21*	0.38*	1.00					
14. Contact is source of friendship	-0.17*	-0.27*	-0.00	1.00				
15. Tie strength	-0.10*	0.04*	-0.17*	-0.32*	1.00			
16. Participant's gender (male)	0.05*	-0.03	-0.02	0.02	-0.04*	1.00		
17. Participant's age	0.05*	0.06*	-0.00	-0.09*	0.21*	-0.09*	1.00	
18. Time spent abroad (in months)	-0.04*	-0.02	-0.04*	0.01	-0.04	0.04	0.07*	1.00

*** p < 0.01 * p < 0.05 + p < 0.10*

[a] *Creativity scores for all three tasks have similar standard deviations, suggesting similar degree of sensitivity.*

TABLE 2: Study 1 - Number of Each Type of Novel Ideas Received (participant-level)

Type of idea	**Dependent variable**	**Sample of other idea categories**					
	Culture - related	**Leisure-related**	**Business opportunities**	**General knowledge**	**Academic advice**	**Work/career advice**	**Philosophy of life**
Key predictor Network cultural diversity	1.27(0.53)*	-0.32 (0.32)	0.70 (0.67)	-0.23 (0.54)	-0.62 (0.54)	-0.81 (0.46)+	-1.02 (0.64)
Control variable							
Network size	0.07 (0.04)+	0.10 (0.02)**	0.16 (0.05)**	0.00 (0.04)	0.10 (0.04)**	0.04 (0.03)	0.11 (0.05)*
Network density	-0.01 (0.43)	0.73 (0.28)**	0.74 (0.55)	-0.20 (0.45)	-0.25 (0.47)	-0.64 (0.38)+	0.15 (0.57)
Gender (male)	-0.19 (0.23)	0.16 (0.15)	0.13 (0.29)	-0.21 (0.24)	-0.03 (0.25)	0.05 (0.21)	-0.57 (0.30)*
Number of countries lived in (>6 months)	0.03 (0.28)	0.00 (0.20)	0.03 (0.37)	-0.26 (0.31)	0.00 (0.33)	-0.13 (0.27)	0.41 (0.38)
Time spent abroad (in months)	0.003 (0.002)+	0.001 (0.001)	-0.005 (0.004)	0.001 (0.003)	0.000 (0.003)	0.005 (0.002)*	-0.007 (0.005)
Participant's age	-0.08 (0.06)	-0.06 (0.04)+	0.13 (0.07)*	0.10 (0.05)+	0.01 (0.05)	0.05 (0.05)	-0.05 (0.07)
Work experience	-0.01 (0.05)	0.02 (0.03)	-0.12 (0.06)*	-0.08 (0.05)+	0.00 (0.05)	-0.03 (0.04)	-0.02 (0.06)
Intercept	-0.13 (1.31)	0.50 (0.80)	-5.20 (1.62)	-2.15 (1.26)	-1.54 (1.29)	-0.91 (1.09)	0.25 (1.61)
LR chi-squared	19.11*	30.42**	15.95*	6.05	10.09	13.15	18.06*
R-squared	0.05	0.04	0.03	0.01	0.02	0.02	0.03
Number of participants	209	209	209	209	209	209	209

** $p < 0.01$ * $p < 0.05$ + $p < 0.10$

TABLE 3: Study 1 - Probit Maximum Likelihood Estimation on Exposure to Novel Ideas from Each Contact (dyadic-level)

Type of idea	**Key dependent variable**	**Sample of other idea categories**					
	Culture - related	**Leisure-related**	**Business opportunities**	**General knowledge**	**Academic advice**	**Work/career advice**	**Philosophy of life**
<u>Key predictor</u> Network cultural diversity	0.60 (0.27)*	-0.13 (0.23)	0.07 (0.29)	-0.08 (0.25)	-0.38 (0.31)	-0.49 (0.26)+	-0.34 (0.32)
Contact is of different culture	0.11 (0.10)	-0.17 (0.08)*	0.15 (0.13)	0.02 (0.12)	0.05 (0.10)	0.06 (0.12)	-0.08 (0.09)
<u>Control variables</u>							
Contact's embeddedness	-0.01 (0.17)	0.42 (0.14)**	0.18 (0.19)	-0.23 (0.19)	-0.05 (0.18)	-0.34 (0.17)*	0.20 (0.26)
Number of countries lived in (>6 months)	-0.02 (0.15)	-0.05 (0.11)	0.08 (0.12)	-0.04 (0.19)	-0.02 (0.12)	-0.03 (0.12)	0.14 (0.20)
Time spent abroad (in months)	0.002 (0.001)	0.000 (0.001)	-0.002 (0.001)	0.000 (0.002)	0.000 (0.001)	0.003 (0.001)**	-0.004(0.002)
Network size	-0.01 (0.02)	0.00 (0.02)	0.02 (0.02)	-0.05 (0.02)**	0.01 (0.02)	-0.03 (0.02)	0.01 (0.02)
Intercept	-1.76 (0.42)**	-0.98(0.27)**	-1.67 (0.42)**	-0.30 (0.32)	-1.95 (0.36)**	-0.68 (0.33)*	-1.21 (0.44)**
Wald chi-squared	18.65	55.16	25.80	25.49	24.97	58.55	31.68
Number of observations	2233	2233	2233	2233	2233	2233	2233

** $p < 0.01$ * $p < 0.05$ + $p < 0.10$

Note: Control variables for the content of network ties, tie strength, and gender not presented due to space constraints.

TABLE 4: Study 1 Regression Results for Participant Creativity

	Model 1	**Model 2**	**Model 3**
Key predictors			
Network cultural diversity	-0.10 (0.38)	0.19 (0.33)	0.18 (0.33)
Global vs. imagination	-	-1.06 (0.19)**	-1.04 (0.19)**
Global vs. others (imagination & local)	-	0.28 (0.11)*	0.09 (0.15)
Network cultural diversity x global vs. others	-	-	0.45 (0.23)*
Control variables			
Gender (participant is male)	0.10 (0.17)	0.02 (0.15)	-0.01 (0.15)
Number of countries lived in (6 months or more)	-0.06 (0.23)	-0.15 (0.20)	-0.13 (0.20)
Time spent abroad (months)	0.002 (0.002)	-0.001 (0.002)	-0.001(0.002)
Network size	-0.04 (0.03)	-0.04 (0.02)+	-0.04 (0.02)+
Network density	0.21 (0.32)	0.07 (0.28)	0.11 (0.28)
Participant's age	-0.03 (0.04)	-0.01 (0.03)	0.00 (0.03)
Work experience	-0.002 (0.03)	-0.01 (0.03)	-0.02 (0.03)
Intercept	3.91 (0.88)**	3.52 (0.78)**	3.52 (0.77)**
R-squared	0.03	0.25	0.27
Number of observations	205	205	205

Note: Standard errors are reported in parentheses. Coefficients are non-standardized.

*** p<0.01; *p<0.05*

TABLE 5: Study 2 Descriptive Statistics and Correlations

Variable	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9
1. Creativity [a]	3.40	1.48	1	6.22	1.00								
2. Network cultural diversity	0.20	0.21	0	0.65	0.14	1.00							
3. Network size (number of ties)	8.71	4.83	3	15	0.03	0.13	1.00						
4. Number of countries lived in (6 months or more)	0.91	1.78	0	10	-0.13	0.07	0.19	1.00					
5. Time spent abroad (in months)	118	233	0	1228	0.18	0.00	0.02	0.46*	1.00				
6. Network density	0.44	0.34	0	1	0.04	-0.08	-0.19	0.01	0.03	1.00			
7. Participant's work experience	28.40	14.38	0	62	-.22	0.02	-0.08	0.20	0.09	0.00	1.00		
8. Gender (participant is male)	0.48	0.50	0	1	0.20*	-0.07	-0.16	-0.05	0.15	-0.15	0.26*	1.00	
9. Participant's age	51.56	14.93	19	80	-0.25*	-0.03	-0.06	0.26*	0.07	0.02	0.93*	0.24*	1.00

* $p < 0.05$

[a] *Creativity scores for all three tasks have similar standard deviations, suggesting similar degree of sensitivity*.

TABLE 6: Study 2 Regression Results for Participant Creativity

	Model 1	**Model 2**	**Model 3**
Key predictors			
Network cultural diversity	1.08 (0.82)	1.04 (0.81)	1.39 (0.79)+
Global vs. imagination	-	0.40 (0.41)	0.46 (0.40)
Global vs. others (imagination & local)	-	0.05 (0.25)	0.01 (0.24)
Network cultural diversity x global vs. others	-	-	1.45 (0.63)*
Control variables			
Network size (number of ties)	0.02 (0.04)	0.03 (0.04)	0.06 (0.04)
Time spent abroad (in months)	0.00 (0.00)	0.002 (0.001)+	0.002 (0.001)+
Number of countries lived in (6 months or more)	-0.19 (0.12)	-0.20 (0.12)	-0.20 (0.12)+
Network density	0.43 (0.54)	0.26 (0.54)	0.38 (0.53)
Participant's work experience	-0.01 (0.04)	-0.02 (0.04)	-0.03 (0.03)
Gender (participant is male)	0.20 (0.38)	0.24 (0.38)	0.48 (0.38)
Participant's age	-0.01 (0.04)	0.01 (0.04)	0.01 (0.04)
Intercept	3.85 (1.03)**	3.23 (1.06)**	2.76(1.04)**
R-squared	0.16	0.22	0.28
Number of observations	72	72	72

Note: Standard errors are reported in parentheses. Coefficients are non-standardized.

*** p<0.01; *p<0.05 +p<0.10*

FIGURE 1: Study 1 Interaction between Network Cultural Diversity and Task Type

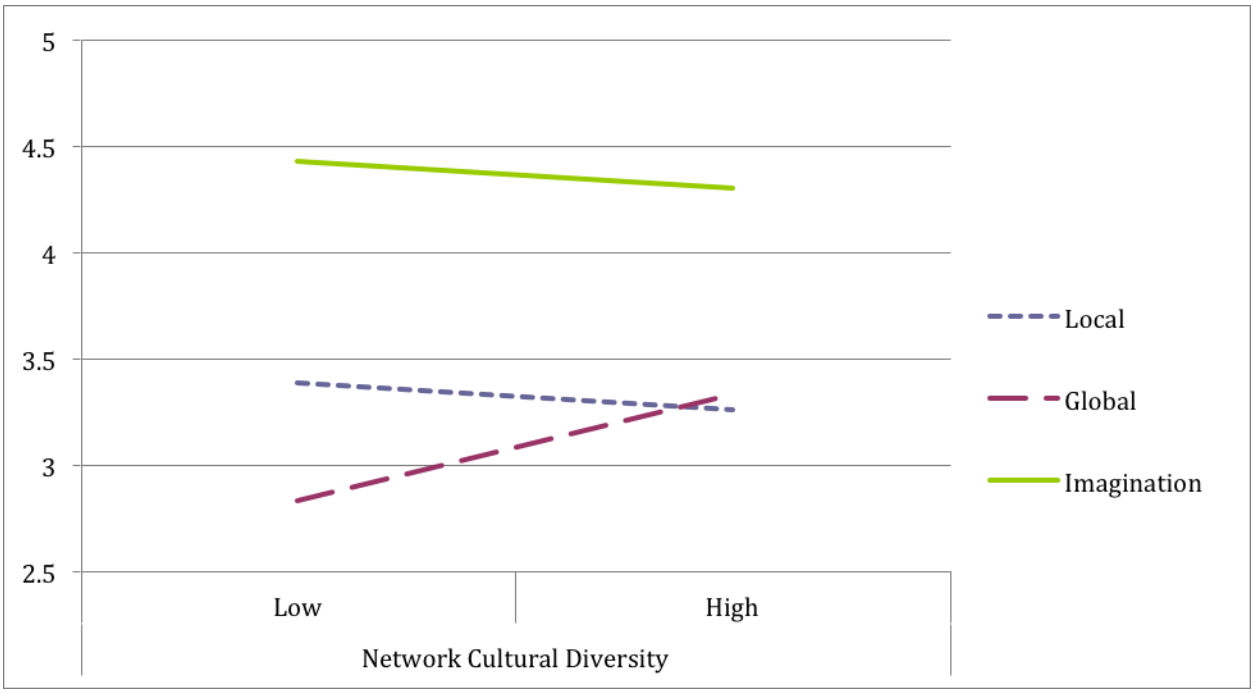

FIGURE 2: Study 2 Interaction between Network Cultural Diversity and Task Type